MULTIMEDIA UNIVERSITY

STUDENT ID NO

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FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

EME 3066 –CAD / CAM

(ME)

9 FEBRUARY 2023
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 4 pages excluding the cover page with 4 Questions only.

2. Attempt all FOUR questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1

a) Your organization had just secured a project to build a bridge connecting two islands. Therefore, you are tasked to lead a group of engineers to complete this project. Before you can delegate the task to your group members, you have to plan all the crucial steps which need to be carried out before building the actual bridge. In the light of your CAD/CAM knowledge, illustrate the necessary steps which you will undertake before constructing the actual bridge. You may provide neat sketches with explanation to support your answers.

[15 marks]

b) Assuming you had completed your task in Q1(a), you are required to simulate the entire bridge under dynamic loading conditions. By using Finite Element Analysis (FEA), illustrate FIVE (5) design factors that you will consider simulating on the bridge. Support your answer with appropriate justifications.

[10 marks]

Continued...

Question 2

a) One of your client had requested a detail prototype of a medical test tube. Assuming the cost to produce the prototype is not an issue, the investor requested that the prototype to be presented in an accurate manner with the detail features easily seen by the human eyes. Hence, propose ONE (1) Rapid Prototype (RP) technique that you will use to fabricate your prototype. Explain why you had selected the RP technique over the others and give brief points on its basic working principle and its schematic diagram. You may assume that all the RP techniques are available within your organization.

[5 marks]

b) Assuming your current workplace do not use RP technology but rather intense manual labor for a certain automotive part fabrication. With an aid of a diagram and assuming cost is not a factor, propose a way on how you are going to convince your superior to adapt RP technology in the company. Explain your answer based on the diagram proposed by you.

[10 marks]

c) List TEN (10) post-processing techniques that can be carried out on a typical workpiece after the fabrication process.

[10 marks]

Continued...

Question 3

(a) With the aid of a neat diagram, draw and label the cutting tool and its corresponding tool holder for milling and turning process.

[6 marks]

(b) You are handling a CNC Milling machine and you note that the maximum depth of cut (DOC) of the machine is 2 mm respectively. During a typical machining process, you are required to mill an aluminium block with thickness of 15 mm to a final thickness of 8 mm. Explain how you are going to carry out the machining process in terms of DOC where the final machining surface of 1 mm is allocated for finishing process. Assuming the cutting tool used is a virgin cutting tool.

(Note: You may provide neat sketches with correct labelling to support your answer)

[9 marks]

(c) Draw and explain a typical chip removal process for a CNC Drilling machine. In your drawing, clearly label the cutting tool (i.e. drill bit), spindle, motor, workpiece and its holder, wear debris collector, coolant supply, motor pump for coolant, filter for coolant and working mechanism for wear debris collector. You may enhance your answer with appropriate attachments to the machine where you think it's necessary.

[10 marks]

Continued...

Question 4

You are tasked to implement a fully automated material handling system for a local logistic company. The following are some criteria's that should be incorporated in the new setup. They are:

- All inventory goods are stored and retrieved automatically with 'zero' manual labour
- The setup should be operational on a normal basis when there is no electricity supply to the company (i.e. power failure)
- The setup can be at any time controlled and monitored remotely. Hence, there should be no interruption in the internet connection of the company
- The material handling process can be viewed real time remotely
- There are FIVE (5) loading and unloading lines
- At the loading and unloading section, the storage and retrieval of the goods should not be seen.
- Since part of the material handling involves radioactive goods, it is to be handled strictly as an independent system. Hence, the transportation of the goods out of the main warehouse is to be at least 10 km. This secondary warehouse is strictly used for loading and unloading of the radioactive goods.

Based on the given descriptions above and assuming cost is on a reasonable factor, draw and label the facility layout neatly. You may state relevant assumptions with appropriate justifications where necessary.

[25 marks]

End of Paper